A General Principle for Limit Theorems in Finitely Additive Probability – The Dependent Case

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A New Ideal Metric and its Applications

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A simple metric $\mu(X, Y) = \mu(P_X, P_Y)$, P_X being the marginal distribution of X, is called an ideal metric of order $r \geqslant 0$, if it possesses the following two properties:

1 (Regularity). For any X and Y independent of Z,

$$\mu(X+Z, Y+Z) \leqslant \mu(X, Y).$$

2 (Homogeneity). For any X, Y and $c \neq 0$,

$$\mu(cX, cY) = |c|^r \mu(X, Y).$$

The existence of an ideal metric of a given order $r \geqslant 0$ was shown by Zolotarev (1976).

In this talk, we introduce a new ideal metric with the advantage that there exists an upper bound depending on the difference pseudomoments but not on the absolute moments, for any $r \geqslant 0$. Because of this advantage, this metric is suitable for the problem related to stable random variables.

Some applications to the rate of convergence in the stable limit theorems will be discussed.

On the Decay of Correlation for Piecewise Linear Transformations

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Let F be a piecewise linear transformation and Φ be its Fredholm determinant. Then we define

$$\eta = \begin{cases} 1 & \text{if } \Phi'(1) = 0, \\ \max\{|\gamma| : \Phi(1/\gamma) = 0 \text{ and } \gamma \neq 1\} & \text{otherwise,} \end{cases}$$

$$\xi = \operatorname{ess\,inf} \lim_{n\to\infty} \frac{1}{n} \log|(F^{(n)})'(x)|.$$

Theorem 1. (i) *Assume that $\xi > 0$ and $\eta < 1$. Then there exists an absolutely continuous invariant measure μ and for $f \in BV$ and $g \in L^1$, the following equation holds for any*